

Monitoring of the effects of added carbon by citrus hydrolates waste in a soil.

Ioppolo A., Laudicina V.A., Badalucco L., Micalizzi A., Saiano F., Palazzolo E.

The hydrolates are the waste to be disposed of are a product of the industrial extraction process of the essential oils through cold pressing of the citrus peels. However, due to the presence of water soluble compounds (sugars, polyphenols, acids), hydrolates could be reused instead of being, due to the high economic burden, a problem in the disposal of the same, charged to the company. The aim of this work was to evaluate the effects of citrus hydrolate when directly applied as irrigation water on soil. Was monitored soil chemical and biochemical property, in particularly effect of the high carbon addition on microbial biomass, activity and structure community and effect on carbon soil stock. The soil used for the experiment was collected from the topsoil (0-10 cm) of a citrus lemon orchard, air-dried and sieved at 2 mm. Then, 450 g of soil were placed in 1L jar and moistened up to 50% of the water holding capacity (WHC) by applying hydrolates and/or water. The tested hydrolates were obtained from three citrus species: Citrus Sinensis, Citrus Limon and Citrus Reticulata. The hydrolates were applied at three different doses to reach 1/3, 2/3 and 3/3 of the 50% of soil WHC. Respectively, 35, 70 and 105 ml of hydrolate were added to 450 g of air-dried soil. Distilled water was added when necessary to complement the 50% of WHC. Control soil was moistened up to 50% of its WHC with distilled water only. At the same time, 20 g of soil per each treatment were similarly incubated in 200 mL jars, sealed with rubber stopper holding silicon septa to monitor the emission of CO₂. Four replicates per treatment were run. Soil samples were incubated in the dark at constant temperature ($23.0 \pm 0.5^{\circ}\text{C}$) and their humidity weekly adjusted up to 50% of WHC by adding distilled water. Microbial biomass C was determined according to the fumigation-extraction method after 1, 4 and 8, weeks of incubation. At the same time, soil fatty acid methyl esters (FAMES) were determined and used as indicators of the main microbial groups. The CO₂ accumulated in the headspace of the jars was measured at days 2, 5, 7 during the first week, then weekly for the following month and finally bi-weekly until day 60. This preliminary study for the possible use of citrus hydrolates as amenders and biostimulants for soil microorganisms showed that they might constitute readily available sources of carbon for microorganisms but at different extent, depending on the citrus species.